N91-12426

27. NOISE POWER SPECTRAL DENSITY OF THE SUNDSTRAND QA-2000 ACCELEROMETER

Information Supplied By: Rex Peters and David Grindeland

Sundstrand Data Control, Inc. Redmond, WA

ABSTRACT

There was no paper presented at the acceleration workshop. However, as several acceleration measurement systems use the Sundstrand sensor, the editors have included some noise PSD information of typical hardware. Figures 1 through 6 reflect measured data.

Comments by Rex Peters:

There are no good data on low frequency (<0.1 Hz) PSD for the Q-Flex accelerometer. We have, however, made some preliminary stability measurements over periods of 12-24 hours and demonstrated stability <0.5 micro-g over >12 hours. The test data appear to contain significant contributions from temperature variations at that level, so the true sensor contribution may be less than that. If what we saw could be construed as a true random process, it would correspond to about 0.1 micro-g rms over a bandwidth from 10^{-5} Hz to about 1 Hz. Other studies of low frequency PSD in flexure accelerometers have indicated that material aging effects tend to approximate a first order Markhov process. If we combine such a model with the spectrum obtained at higher frequencies, it suggests the spectrum shown in Table 1 and in Figure 7 as a conservative estimate of Q-Flex noise performance.

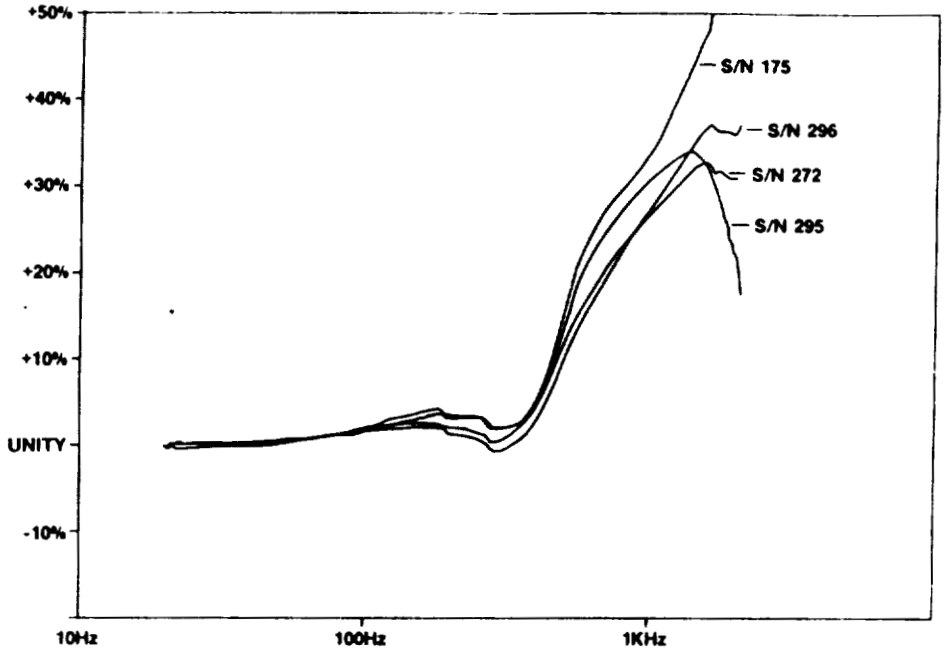

FIGURE 1. QA-2000 AMPLITUDE RESPONSE

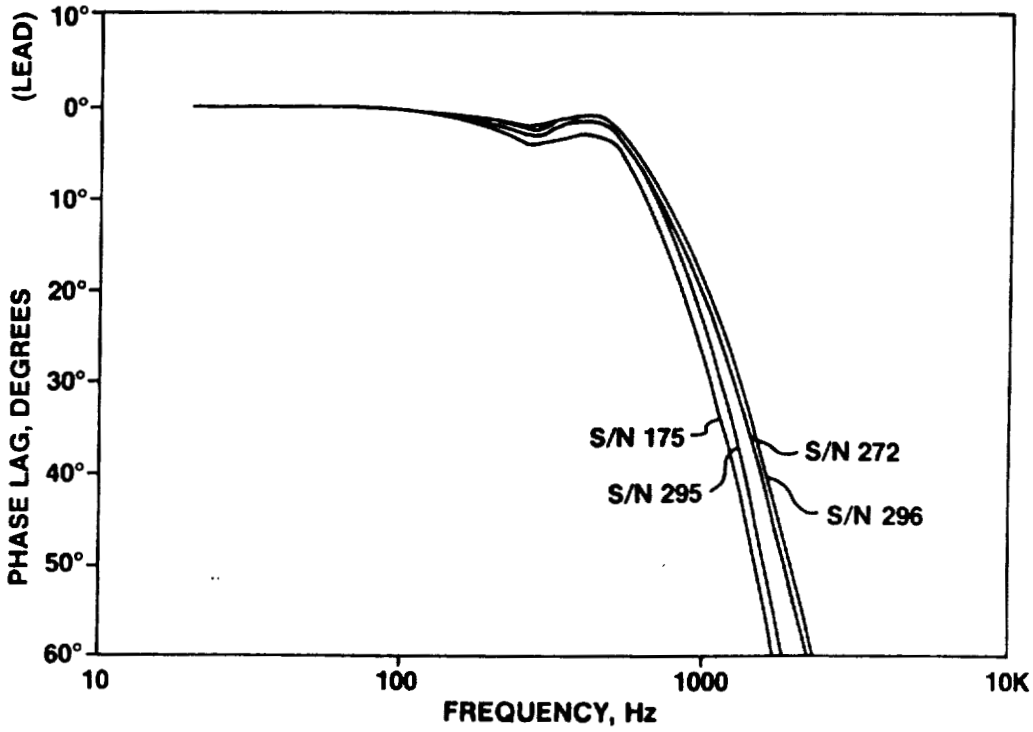

FIGURE 2. QA-2000 PHASE RESPONSE

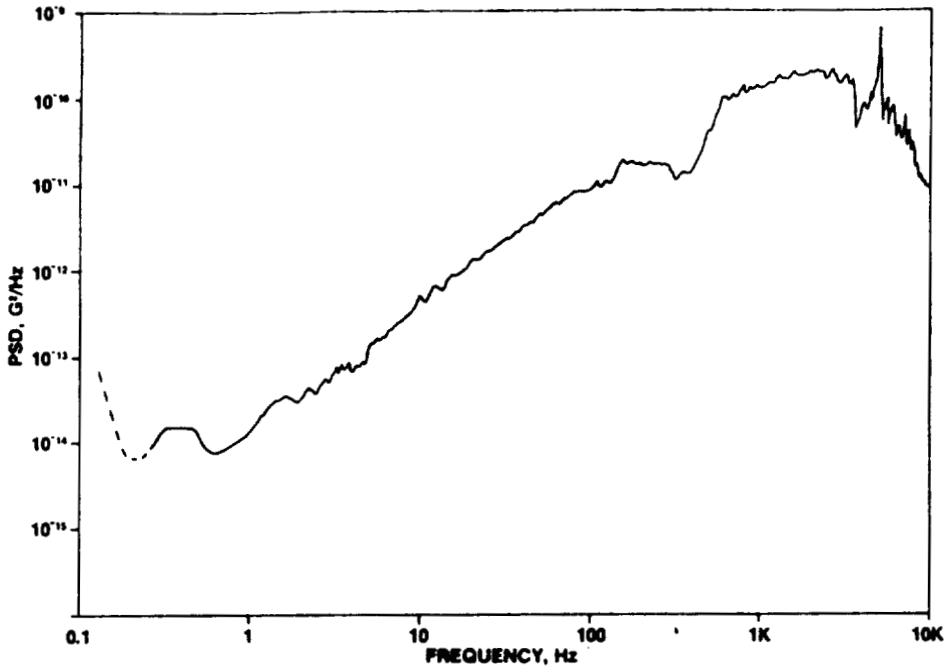

FIGURE 3. NOISE POWER SPECTRAL DENSITY QA-2000-002 SERIAL NO. 175

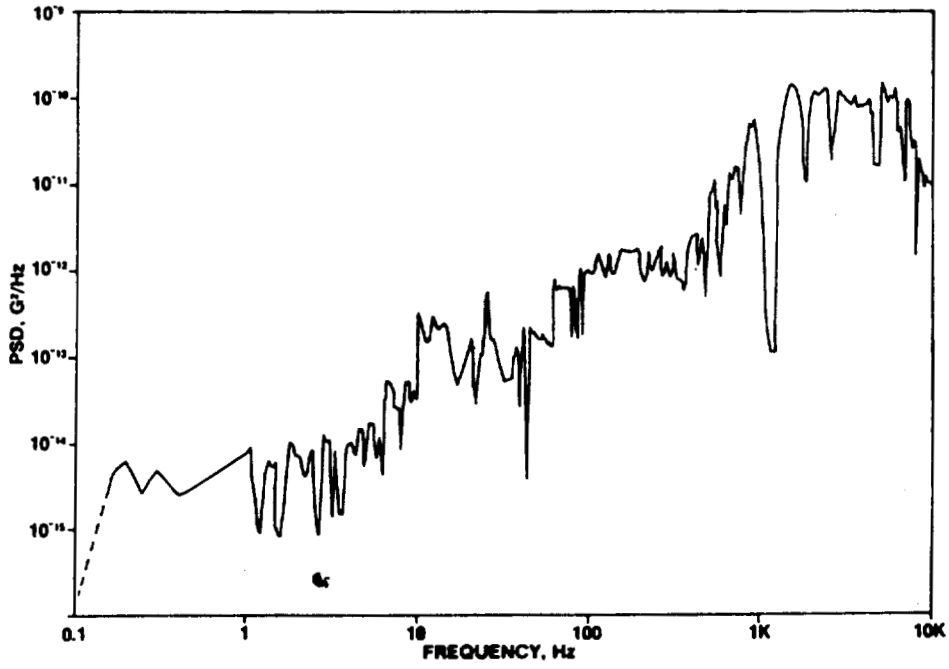

FIGURE 4. NOISE POWER SPECTRAL DENSITY QA-2000-001 SERIAL NO. 272

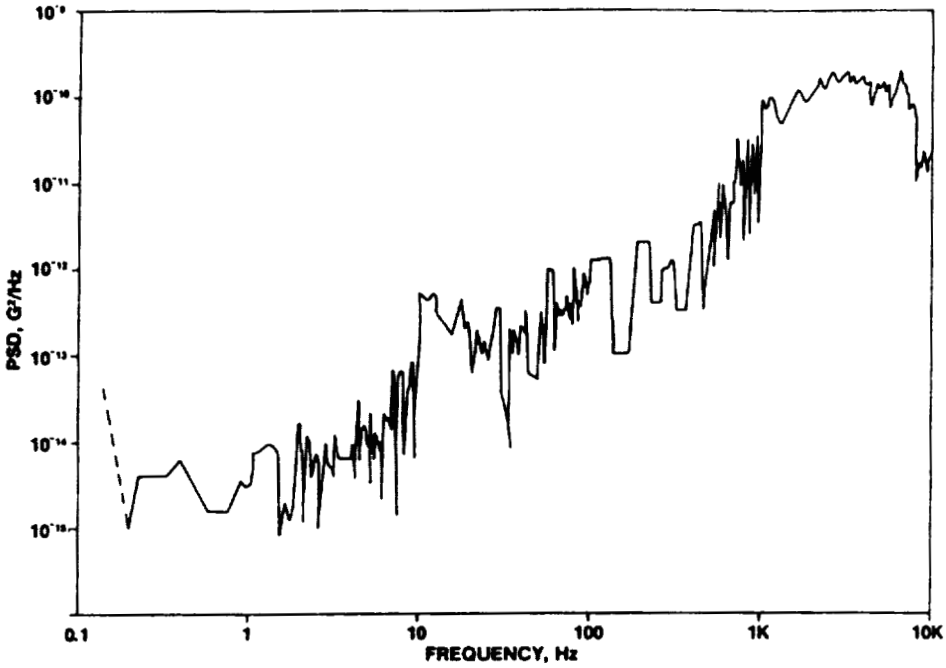

FIGURE 5. NOISE POWER SPECTRAL DENSITY QA-2000-001 SERIAL NO. 295

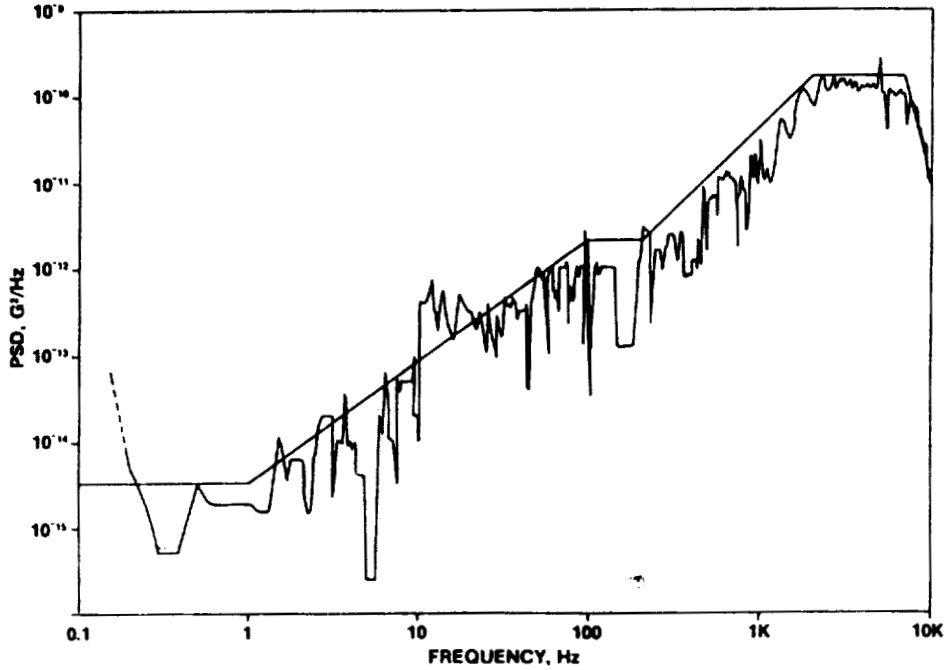

FIGURE 6. NOISE POWER SPECTRAL DENSITY QA-2000-001 SERIAL NO. 296

TABLE 1. ESTIMATED Q-FLEX NOISE PERFORMANCE

BANDWIDTH	g (rms)
10^{-5} Hz to 5 x 10^{-3} Hz	8.7 x 10^{-8}
10^{-5} Hz to 1 Hz	10.2 x 10^{-8}
10^{-5} Hz to 50 Hz	11 x 10^{-6}
10^{-4} Hz to 5 x 10^{-3} Hz	2.7 x 10^{-8}
10^{-4} Hz to 1 Hz	6.1 x 10^{-8}
10^{-4} Hz to 50 Hz	11 x 10^{-6}
10^{-3} Hz to 1 Hz	5.5 x 10^{-8}

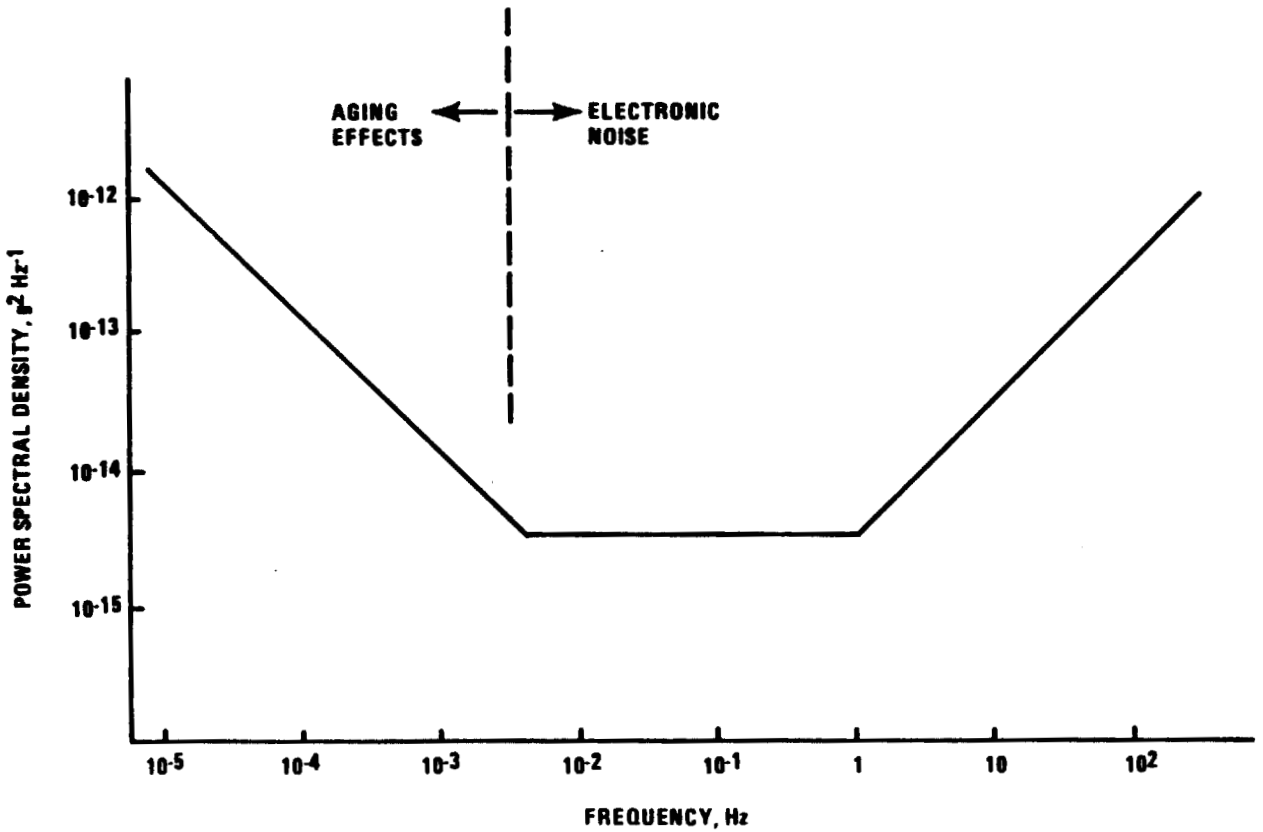

FIGURE 7. NOISE POWER SPECTRUM OF Q-FLEX ACCELEROMETER